

only sparingly punctured; the middle part, indeed, is almost free from punctures. Scutellum large, quite impunctate. Elytra only finely and sparingly punctured, the punctures arranged almost in lines, the sides towards the apex and the apex strigose. Pygidium strigose, but shining. Under surface green; sides of the breast with scanty pale hairs and coarsely strigose, the centre smooth and shining. The mesosternal process very short and broad, densely pubescent along its front. Front tibiæ acutely tridentate.

This species is allied to *Cetonia fulgida*, Fab. (genus *Erirhipis*, Burm.), but is larger, without pale marks, and has the head differently shaped.

Though I have examined a series of ten individuals of this species, I see no indications of any external sexual distinctions.

---

Geographical Distribution of Indian Freshwater Fishes.—Part I.  
The Acanthopterygii, Spiny-rayed Teleostean Fishes. By  
FRANCIS DAY, F.L.S., F.Z.S., &c.

[Read December 7, 1876.]

DURING comparatively recent times much interest has been manifested regarding the geographical distribution of the fauna of India, and arguments have been adduced to demonstrate the predominance in it of the Malayan or African element.

As a small contribution to the facts which are being accumulated, I propose a consideration of the distribution of the freshwater fishes, believing they must afford evidence upon which some conclusions may be based. My limits will be Hindustan proper, including the Punjab and Sind, as well as Ceylon, Assam, Burma, the Andamans, and the Nicobars.

The freshwater fishes consist:—

- (1) Of those which reside entirely in fresh water.
- (2) Of those which enter it from the sea for breeding or predaceous purposes.

The second will be briefly considered, and only when the species belongs to a genus which likewise inhabits fresh water. In such instances it will be necessary to trace out every species of which the genus is composed.

The freshwater fishes, thus circumscribed, consist of:—

(a) Hill-residents, whether entirely or occasionally.

(b) Fishes of the plains, some of which are migratory, extending their range over vast regions, whilst others are more locally distributed, such as being confined to Cutch, or Western or Southern India including Ceylon, or restricted to the deltas of large rivers.

This investigation may, for convenience, be divided into:—

- |      |  |
|------|--|
| I.   | The distribution of Acanthopterygii.             |
| II.  | "    "    Anacanthini and Siluridæ.              |
| III. | "    "    Cyprinidæ, Clupeidæ, and their allies. |

Restricting myself in this paper to the Acanthopterygian or spiny-rayed Teleostean fishes, we find nine families which possess true freshwater representatives in India. They are as follows:—

1. PERCIDÆ. Genus 1. *Ambassis*<sup>1</sup>, Commerson.

a. Fresh waters throughout India, also in Malay archipelago.

b. Marine, both Malay archipelago and Africa.

2. NANDIDÆ. Genus 1. *Badis*<sup>2</sup>, Bleeker.

Fresh waters of India (excluding Sind and Ceylon<sup>3</sup>) and Burma.

Genus 2. *Nandus*<sup>4</sup>, Cuv. & Val.

Fresh waters of India to the Malay archipelago.

Genus 3. *Pristolepis*<sup>5</sup>, Jerdon.

Malabar<sup>6</sup>, Burma, Siam, and Malay archipelago.

<sup>1</sup> This genus includes:—*Chanda*, pt., Ham. Buch.; *Hamiltonia*, Swainson; *Bogoda*, *Parambassis*, and *Pseudambassis*, Bleeker.

<sup>2</sup> Includes *Bedula*, Gray.

<sup>3</sup> The fishes of Ceylon have been so little worked out, that none of this family have been as yet recorded from that island; but such is by no means conclusive evidence that they do not live there. I suspect *Nandus marmoratus* will be found in the waters of the plains, and some species of *Pristolepis* in those of the hills. Whilst writing this paper I discovered in the Indian Museum a collection of Ceylon fishes made by Dr. Kelaart, amongst which are several common to the continent of India.

<sup>4</sup> Includes *Bedula*, Gray.

<sup>5</sup> Includes:—*Catopra*, Bleeker; *Paranandus*, Day.

<sup>6</sup> By *Malabar* I do not understand the districts so designated in Bloch's time; I only mean the western coast of India from below Mangalore. In former days the lower portion of the Coromandel coast was so termed; and even now the natives of Madras designate those residing to the south as Malabars.

3. SCIÆNIDÆ. Genus 1. *Sciæna*<sup>1</sup>.

- a. Fresh waters of India and Burma to the Malay archipelago.
- b. Marine species found also in Africa and the Malay archipelago. This family does not appear to be represented in the Red Sea, doubtless due to the water being too clear, and no large rivers opening along its coasts.

4. GOBIIDÆ. Genus 1. *Gobius*<sup>2</sup>, Artedi.

- a. Fresh waters of India, Ceylon, Malay archipelago, and Africa.
- b. Marine, in India, Ceylon, Malay archipelago, and Africa.

Genus 2. *Sicydium*<sup>3</sup>, Cuv. & Val.

- a. Fresh waters of Canara<sup>4</sup> and Burma to the Malay archipelago and beyond.

Genus 3. *Periophthalmus*, Schn.

Larger rivers of Bengal and Burma to the Malay archipelago and beyond, also West Africa.

<sup>1</sup> Includes:—*Johnius*, Bloch; *Corvina* and *Stellifer*, Cuv.; *Bola*, pt., H. B.; *Leiosomus*, Cuv. & Val.; *Coracinus*, Pall.; *Homoprion*, Holb.; *Amblyodon* (Raf.), Gill; *Cheilotrema*, v. Tsch.; *Genyonemus*, *Plagioscion*, *Sciænops*, *Bairdiella*, *Haploinodotus*, *Rhinoscion*, and *Ophioscion*, Gill; *Diplolepis*, Steind.; *Pseudo-sciæna*, Bleeker.

<sup>2</sup> For synonyms see 'Fishes of India,' p. 282.

<sup>3</sup> Includes:—*Sicyopterus*, Gill; *Catylopus*, Guich.; *Sicydiops* and *Microsicydium*, Bleeker.

<sup>4</sup> The following species was obtained from the fresh water of Canara, but having been mislaid, was omitted from the 'Fishes of India.' As, however, its existence is of importance in the geographical distribution, I describe it here.

SIKYDIUM GRISEUM, n. sp.

B. iv. D.  $6\frac{1}{10}$ . P. 17, V. 6, A. 11, C. 13, L. 1. 80, L. tr. ca. 25.

Length of head  $5\frac{1}{2}$ , of caudal fin  $6\frac{1}{2}$ , height of body 6 in the total length. *Eyes*, diameter 4 in the length of the head, rather above 1 diameter from the end of snout, and  $1\frac{1}{2}$  apart. *Body* subcylindrical; upper surface of the head flat, and its greatest breadth equalling its width. Cleft of mouth extending to below the first third of the eye. Lower jaw horizontally placed. Lips thick, the upper with a coarsely fringed edge: snout not overhanging the mouth. No barbels. *Teeth*—in the upper jaw, small, closely set, and implanted in the gums in a single row: in the lower jaw the outer row horizontal; posterior to them, and above the symphysis, are two strong recurved canines. *Fins*—dorsal spines filiform and projecting beyond the membrane; caudal rounded. *Scales* strongly ctenoid, of irregular sizes and shapes, and in irregular rows; they extend forwards to nearly as far as the eyes; none on the head. *Colours*—brownish, with eight or nine rings of a

- Genus 4. *Eleotris*<sup>1</sup>, Gronovius.  
Large rivers of India, Africa, and the Malay archipelago.
5. RHYNCHOBDELLIDÆ. Genus 1. *Rhynchobdella*, Cuv. & Val.  
From Syria through Sind, India, Ceylon, Burma, to the Malay archipelago.  
Genus 2. *Mastacembelus*, Cuv. & Val.  
From Syria through Sind, India, Ceylon, Burma, to the Malay archipelago; also West Africa.
6. MUGILIDÆ. Genus 1. *Mugil*, Artedi.  
*a.* Fresh waters of Sind, N.W. provinces, Bengal, Assam, Burma.  
*b.* Marine, to the Malay archipelago and Africa.
7. OPHIOCEPHALIDÆ. Genus 1. *Ophiocephalus*, Bloch.  
Fresh waters of Beluchistan, Afghanistan, throughout India and Ceylon to the Malay archipelago.  
Genus 2. *Channa*, Gronov.  
Ceylon and China.
8. LABYRINTHICI. Genus 1. *Anabas*, Cuvier.  
India and Ceylon to the Malay archipelago.  
Genus 2. *Polyacanthus*, Cuv. & Val.  
Canara, Southern India, Ceylon, to the Malay archipelago.  
Genus 3. *Osphromenus*<sup>2</sup>, Lacép.  
Eastern Bengal, Assam, to the Malay archipelago.  
Genus 4. *Trichogaster*<sup>3</sup>, Bloch.  
Sind, through India (except Madras and south of the Kistna, Malabar, and Ceylon) to Burma and Siam.
9. CHROMIDES. Genus 1. *Etroplus*, Cuv. & Val.<sup>4</sup>  
Western and Southern India, also Ceylon.

If we examine the foregoing 9 families and 19 genera, we

darker tint surrounding the body and wider than the ground-colour; fins dark, most deeply so at their edges.

*Hab.* South Canara, where I procured two specimens in fresh water, the longest being 3 inches.

<sup>1</sup> For genera included see 'Fishes of India,' p. 309.

<sup>2</sup> Includes:—*Trichopus*, Lacép.; *Ctenops*, McClell.; *Trichopsis*, Kner.

<sup>3</sup> Includes *Colisa*, Cuv. & Val.

Includes *Pseudetroplus*, Bleeker.

cannot help observing that they do not give one single instance of a freshwater genus being restricted to India and Africa, whilst the majority are common to the Indian and Malayan faunæ. In short, they may be divided as follows:—Of the 19 freshwater genera, 15 reach the Malay archipelago; of the remaining 4 genera, *Badis* exists in Burma, and may extend to Siam and beyond, *Trichogaster* is found in Siam, whilst *Channa* is common to Ceylon and China. The remaining genus, *Etrophus*, is confined to Western and Southern India, also Ceylon; whilst recently Dr. Bleeker has discovered that a nearly allied genus (*Paretrophus*, Bleeker) is present in Madagascar. This island, however, may or may not originally have been joined on to Africa. It has been observed that “Madagascar, divided from Africa by a deep channel 300 miles wide, possesses so many peculiar features as to indicate separation at a very remote antiquity, or even to render it doubtful whether the two countries have ever been absolutely united” (Wallace, ‘Malay Archipelago,’ ii. p. 11).

Out of the foregoing 19 freshwater genera existing in India, only 3 have as yet been recorded from Africa, but 15 from the Malay archipelago, whilst all the marine genera common to Africa and India extend to the Malay archipelago.

It may therefore be fairly assumed that amongst the freshwater Acanthopterygian fishes of India and Ceylon a well-marked Malayan character is present, whereas an African element is but slightly apparent.

Having thus briefly disposed of the families and genera, it becomes necessary to show where the various species reside, and the range within which they are limited, in order to attempt to evolve whether any, and, if so, what subregions exist.

#### Fam. PERCIDÆ.

##### Genus AMBASSIS.

###### 1. *A. NANA*<sup>1</sup>, Ham. Buch.

Sind, the entire plains of India (excluding the Malabar coast and Assam), to Burma.

###### 2. *A. RANGA*<sup>2</sup>, Ham. Buch.

<sup>1</sup> Includes:—*Chanda phula* and *C. bagoda*, Ham. Buch.; *Ambassis oblonga*, Cuv. & Val.; *A. indica*, M’Clelland.

<sup>2</sup> Includes:—*Chanda lala*, Ham. Buch. (young); *C. ruconius*, M’Clelland; *Ambassis Barlovi*, Sykes; *A. alta*, Cuv. & Val.



Sind, the entire plains of India (excluding the Malabar coast and Assam), to Burma.

3. *A. BACULIS*, Ham. Buch.

From the Punjab to Bengal, Orissa, and Burma.

4. *A. THOMASSI*, Day.

Western coast of India, from South Canara, certainly as low as Cochin.

5. *A. DAYI*<sup>1</sup>, Bleeker.

Malabar coast of India, especially its more southern portions.

The representatives of this genus in India are divisible into three classes:—

*A. Marine*.—1. *A. Commersonii*, Cuv. & Val., from the Red Sea and east coast of Africa, throughout the Indian Ocean. 2. *A. interrupta*, Bleeker, from the Andamans to the Malay archipelago. 3. *A. gymnocephalus*<sup>2</sup>, Lacép., from the east coast of Africa, through the seas of India, to the Malay archipelago. 4. *A. urotænia*<sup>3</sup>, Bleeker, from (? Red Sea,) Seychelles and Andamans to the Malay archipelago.

Out of the foregoing 4 marine species, 3 appear to be common to both the African and Malayan faunæ, and 1 to the Andamans as well as to the Malay archipelago.

*B. Estuary*.—This comprises species concerning which it is very difficult to decide whether they mostly prefer brackish water or extend their range downwards to the sea or upwards into the rivers. Thus we have *A. nalua*, H. B., which appears to frequent the entire coast of India, the Andamans, and the Malay archipelago.

*C. Freshwater*.—There are 5 species at present recognized: 2 are generally distributed throughout Sind, India, and Burma, excluding the Malabar coast; 1 appears to be absent from Sind and Southern India, but is otherwise distributed as the other two species. The remaining 2 species are found from Canara down the western or Malabar coast of India.

The deduction from the foregoing must be that South Canara and Malabar possess distinct species of this genus from those distributed elsewhere throughout Sind, India, and Burma;

<sup>1</sup> Includes ?*A. malabaricus*, Jerdon.

<sup>2</sup> Includes:—*A. Dussumieri*, C. & V.; *Priopsis argyrozona*, C. & V.; *Ambassis Vachelli*, Peters.

<sup>3</sup> Includes ?*A. denticulata*, Klunzinger.

whereas those in the latter wide extent of country appear to be generally diffused. The Malabar<sup>1</sup> are local races, whereas the Hindustan forms are widely spread.

### Family NANDIDÆ.

#### Genus BADIS.

1. *B. BUCHANANI*, Bleeker.

From the N.W. Provinces to Bengal, Orissa, and Western India; also found in Assam and Burma certainly as high as Mandalay.

2. *B. DARIO*, Ham. Buch.

Northern portions of Bengal, Behar, and along the western ghats of India.

#### Genus NANDUS.

*N. MARMORATUS*<sup>2</sup>, Cuv. & Val.

Throughout the whole of India and Burma (excluding Ceylon and Sind) to Siam.

#### Genus PRISTOLEPIS.

1. *P. MARGINATUS*<sup>3</sup>, Jerdon.

Western ghats of India and rivers along their bases.

2. *P. MALABARICUS*, Günther.

The same localities as the last, of which it may be merely a variety.

3. *P. FASCIATUS*<sup>4</sup>, Bleeker.

Fresh waters of Burma, Siam, and the Malay archipelago.

The species of the three Nandioid genera found in India give the following results:—*Nandus* is generally distributed except in Sind and elevated regions, extending eastward at least to Siam. It is a widely diffused fish. *Badis* shows species (perhaps the two are varieties of one) extending from the plains on to moderately elevated hills, and having a wide distribution to the east. *Pristolepis* is more confined to hilly regions or their bases in India proper, or, rather, Malabar; and then a wide hiatus exists, as it has not been discovered nearer than Burma, where it is found in the plains. There is, however, a slight difference in these fishes, which

<sup>1</sup> I have omitted allusion to *A. thermalis*, C. & V., from the warm springs of Cania, in Ceylon, and which may be one of those mentioned as found in India. Anyhow it proves the existence of this genus in the fresh waters of Ceylon.

<sup>2</sup> Includes *Bedula Hamiltonii*, pt., Gray & Hardw.

<sup>3</sup> Includes *Catopra tetraacanthus*, Günther.

<sup>4</sup> Includes *Catopra siamensis*, Günther.

should be remarked. The Malabar form or forms have villiform teeth on the vomer; those in Burma and to the east have globular ones.

## Fam. SCIENIDÆ.

## Genus SCIENA.

*S. COITOR*<sup>1</sup>, Ham. Buch.

Throughout the larger rivers of India and Burma, descending to the sea at certain seasons. It has been taken in the Malayan peninsula by Dr. Cantor.

Estuary and marine examples of this genus are found both along the coasts of Africa, through the sea of India, to the Malay archipelago and beyond.

The following species inhabit the seas and estuaries of India:—

1. *Sciæna Bleekeri*, Day, Beluchistan to Bombay.
2. *S. miles*<sup>2</sup>, Lacép., seas of Africa to the Malay archipelago.
3. *S. Vogleri*, Bleeker, seas of India to the Malay archipelago.
4. *S. sina*, Cuv. & Val., from Beluchistan through the seas of India to the Malay archipelago.
5. *S. cuja*<sup>3</sup>, Ham. Buch., estuaries of the Ganges and Japan.
6. *S. axillaris*, Cuv. & Val., seas of India.
7. *S. albida*<sup>4</sup>, Cuv. & Val., seas and estuaries of India and Burma.
8. *S. diacanthus*<sup>5</sup>, Lacép., seas and estuaries of India to the Malay archipelago and China.
9. *S. aneus*<sup>6</sup>, Bloch, seas of India to the Malay archipelago.
10. *S. maculata*<sup>7</sup>, Bl. Schn., seas of India.
11. *S. Belengeri*<sup>8</sup>, Cuv. & Val., seas of India to the Malay archipelago and beyond.
12. *S. semiluctuosa*, Cuv. & Val., from Be-

<sup>1</sup> *Sciæna (Corvina) nasus*, Steind., from Calcutta, is probably this species; also *Johnius Dussumieri*, Cantor, from Pinang, the Malayan peninsula, and Singapore.

<sup>2</sup> Includes:—*Labrus tella katchelee*, Russell; *Corvina soldado*, Cantor; *C. Wolfii*, *sampitensis*, and *celebica*, Bleeker; *C. dorsalis*, Peters,—from the Mozambique through the seas of India to the Malay archipelago.

<sup>3</sup> *Scienoides asper*, Blyth (young).

<sup>4</sup> Includes:—*Bola coitor*, Ham. Buch.; *Johnius anei*, Blyth; *Corvina Neilli*, Day.

<sup>5</sup> Includes:—*Labrus nella katchelee*, Russell; *Bola chaptis*, H. B.; *Johnius catalaus* and *Corvina platycephala*, Cuv. & Val.; *Sciæna maculata*, Gray & Hardw.; *Johnius Valenciennesi*, Eyd.

<sup>6</sup> Includes *Otolithus macrophthalmus*, Bleeker.

<sup>7</sup> Includes *Perca sari-kullah*, Russ.

<sup>8</sup> Includes:—*Sparus*, Russell, fig. cxi.; ? *Corvina lobata*, Cuv. & Val.; *C. Kuhl'i*, Cuv. & Val.



luchistan through the seas of India to China. 13. *S. glaucus*, Day, seas of India. 14. *S. carutta*<sup>1</sup>, Cuv. & Val., seas of India to the Malay archipelago. 15. *S. osseus*, Day, Malabar coast of India.

The foregoing 15 species of marine and estuary Sciænas can be divided thus:—6 as yet recorded only from India; 8 India to the Malay archipelago, or China, or Japan; 1 from India and Africa to the Malay archipelago. But the fact must not be overlooked that there has been no worker along the African coast as Bleeker has worked the fish-fauna of the Malay archipelago.

### FAM. GOBIIDÆ.

#### Genus GOBIUS.

##### *G. GIURIS*<sup>\*</sup>, Ham. Buch.

Fresh water throughout the plains of India, Sind, Ceylon, and Burma to the Malay archipelago and east coast of Africa; also found along the coast.

The following species inhabit the seas and estuaries, some ascending up tidal rivers:—

1. *G. bynoensis*<sup>2</sup>, Richardson, sea at Andamans and Malay archipelago. 2. *G. sexfasciatus*, Day, sea, Madras. 3. *G. brevirostris*, Günther, sea at Kurrachee in Sind, also China. 4. *G. griseus*, Day, estuaries, Madras. 5. *G. polynema*, Bleeker, seas of India and Malay archipelago. 6. *G. macrostoma*, Steind., sea, Bombay. 7. *G. viridipunctatus*<sup>3</sup>, Cuv. & Val., from Sind through the seas of India to the Malay archipelago. 8. *G. ocellatus*, Day, sea, Sind and Bombay. 9. *G. Masoni*, Day, sea, Bombay. 10. *G. cyanomos*<sup>4</sup>, Bleeker, seas of India to the Malay archipelago. 11. *G. criniger*<sup>5</sup>, Cuv. & Val., seas of east coast of Africa, India, to the Malay archipelago. 12. *G. puntang*<sup>6</sup>, Bleeker, estuaries

<sup>1</sup> Includes *S. carouna*, C. & V.

<sup>\*</sup> Includes:—*G. korah mottah*, *koku*, and *bullee kokah*, Russell; *G. kurpah*, Sykes; *G. kokius*, *catebus*, and *kora*, Cuv. & Val.; *G. platycephalus*, Peters; *G. spectabilis*, Günther.

<sup>2</sup> Includes *G. stethophthalmus*, Bleeker.

<sup>3</sup> Includes:—*G. nuna mottah*, Russell; *G. venenatus*, Cuv. & Val.; *G. chlorostigma*, Bleeker.

<sup>4</sup> Includes *G. scotus*, Jerdon (not Cuv. & Val.).

<sup>5</sup> Includes:—*G. brevifilis*, Cuv. & Val.; *G. Kreffii*, Steind.; *G. caninus*, Günther and Playfair, Fish. Zanz. (not, Cuv & Val.).

<sup>6</sup> Includes *G. andamanensis*, Day.

and the sea from the Andamans to the Malay archipelago. 13. *G. Bleekeri*, Day, estuaries, Madras. 14. *G. zonalternans*, Day, brackish water, Madras. 15. *G. biocellatus*<sup>1</sup>, Cuv. & Val., coasts of Sind, India to the Malay archipelago. 16. *G. madraspatensis*, Day, estuaries, Madras. 17. *G. Neilli*, Day, sea and estuaries, Madras. 18. *G. melanosticta*, Day, estuaries of Madras. 19. *G. cristatus*, Day, coasts of India. 20. *G. tentacularis*<sup>2</sup>, Cuv. & Val., seas of India to the Malay archipelago. 21. *G. acutipennis*<sup>3</sup>, Cuv. & Val., seas of India to the Andamans. 22. *G. striatus*, Day, estuaries of Madras and Canara, ascending rivers. 23. *G. personatus*<sup>4</sup>, Bleeker, estuaries and seas of India to the Malay archipelago. 24. *G. malabaricus*, Day, estuaries of Madras, and ascending rivers in Malabar. 25. *G. planifrons*, Day, sea, Bombay. 26. *G. elegans*, Cuv. & Val., sea, Bombay and Malay archipelago. 27. *G. ornatus*<sup>5</sup>, Rüpp., Red Sea, seas of India, to the Malay archipelago. 28. *G. gutum*, Ham. Buch., estuaries of the Hooghly. 29. *G. albo-punctatus*<sup>6</sup>, Cuv. & Val., Red Sea, seas of India, Andamans, to Feejee and beyond. 30. *G. semidoliatus*, Cuv. & Val., Red Sea, Andamans. 31. *G. magniloquus*, Day, sea, Madras. 32. *G. planiceps*, Day, sea, Madras. 33. *G. sadanundio*, Ham. Buch., estuaries of Ganges and sea along the coast of Burma. 34. *G. melanosoma*<sup>7</sup>, Bleeker, Andamans and Nicobars to the Malay archipelago. 35. *G. nunus*, Ham. Buch., estuaries of the Hooghly and Burma, ascending rivers.

The foregoing 35 species of marine and estuary Gobies (*Gobius*) can be divided thus:—21 as yet only recorded from India; 11 common to India and the Malay archipelago; 2 common to India and China or beyond; 1 common to Africa, India, and the Malay archipelago.

<sup>1</sup> Includes *G. celebicus*, Cuv. & Val.; *G. subtilis*, Cantor.

<sup>2</sup> Includes *G. macrurus*, Bleeker.

<sup>3</sup> Includes *G. setosus*, Cuv. & Val.

<sup>4</sup> Includes:—*G. melanocephalus* and *gramnepomus*, Bleeker; *G. litturatus*, Steind.; *G. Stoliczka*, Day.

<sup>5</sup> Includes:—*G. ventralis*, Cuv. & Val.; *G. interstinctus*, Richardson; *G. periphthalmoides*, Bleeker.

<sup>6</sup> *G. punctillatus*, Rüpp.; *G. Padangensis*, Bleeker; *G. breviceps*, Blyth.

<sup>7</sup> Includes *G. gobiodon*, Day.

## Genus SICYDIUM.

1. *S. FASCIATUM*, Day.

Fresh water of Burma.

2. *S. GRISEUM*, Day.

Fresh water of Canara.

## Genus PERIOPHTHALMUS.

*P. SCHLOSSERI*<sup>1</sup>, Pallas.

This little fish is found in fresh water and also in estuaries from Bengal to the Malay archipelago.

The following species likewise inhabits the sea and estuaries :—*P. Koelreuteri*<sup>2</sup>, Pallas. It extends from India to the Malay archipelago.

## Genus ELEOTRIS.

*E. FUSCA*<sup>3</sup>, Bl. Schn.

This fish is found far inland in fresh water ; it also inhabits the west coast of Africa, seas of India to the Malay archipelago and beyond.

The following species of this genus inhabit the seas and estuaries, some ascending tidal rivers :—1. *E. macrolepidota*, Bloch, said to have come from India. 2. *E. muralis*, Cuv. & Val., seas of India to the Malay archipelago. 3. *E. sexguttata*, Cuv. & Val., Ceylon to the Malay archipelago. 4. *E. feliceps*, Blyth, Andamans. 5. *E. macrodon*, Bleeker, estuaries of Lower Bengal and Burma. 6. *E. porocephalus*<sup>4</sup>, Cuv. & Val., seas and estuaries of Burma, and the Andamans to the Malay archipelago. 7. *E. ophiocephalus*<sup>5</sup>, Cuv. & Val., coasts of Africa, Andamans, to the Malay archipelago. 8. *E. cavifrons*, Blyth; Andamans. 9. *E. canarensis*, Day, Canara. 10. *E. lutea*, Day, Andamans. 11. *E. scintillans*, Blyth, Akyab and Andamans. 12. *E. litoralis*, Day,

<sup>1</sup> Includes :—*G. tredecem-radiatus*, *septem-radiatus*, and *novem-radiatus*, Ham. Buch. ; *Periophthalmus Freycineti*, Cuv. & Val.

<sup>2</sup> Includes :—*Periophthalmus papilio*, Bl. Schn. ; *P. argentilineatus*, C. & V. ; *P. kalolo*, Less. ; *P. modestus*, Cantor ; *P. dipus*, Bleeker ; *P. fuscatus*, Blyth.

<sup>3</sup> Includes :—*Cobitis pacifica*, Forst. ; *Cheilodipterus culius*, Ham. Buch. ; *Eleotris nigra*, Quoy & Gaim. ; *E. mauritanus*, Bennett ; *E. incerta*, Blyth ; *E. soaresi*, Playfair.

<sup>4</sup> Includes *Eleotris Cantoris*, Günther.

<sup>5</sup> Includes :—*E. margaritacea*, Cuv. & Val. ; *E. viridis*, Bleeker.

Andamans. 13. *E. caperata*<sup>1</sup>, Cantor, coasts of India, Andamans, to the Malay archipelago. 14. *E. butis*<sup>2</sup>, Ham. Buch., seas and estuaries of India to the Malay archipelago. 15. *E. amboinensis*<sup>3</sup>, Bleeker, seas and estuaries of India to the Malay archipelago.

The foregoing 15 species of marine and estuary *Eleotres* can be divided thus:—8 as yet only recorded from Indian localities; 6 common to India and the Malay archipelago; 1 common to India, Africa, and the Malay archipelago.

#### Fam. RHYNCHOBDELLIDÆ.

##### Genus RHYNCHOBDELLA.

###### R. ACULEATA<sup>4</sup>, Bloch.

Estuaries, brackish waters, and deltas of large rivers throughout the Indian (? Ceylon) district, and extending to Borneo and beyond.

##### Genus MASTACEMBELUS.

###### 1. M. UNICOLOR, Cuv. & Val.

Fresh waters of Burma to Java.

###### 2. M. ZEBRINUS, Blyth.

Fresh waters of Burma.

###### 3. M. PANCALUS<sup>5</sup>, Ham. Buch.

Bombay Presidency (inland), deltas of large rivers (excluding those of the Malabar coast and Madras south of the Kistna), also Assam.

###### 4. M. ARMATUS<sup>6</sup>, Lacép.

This freshwater fish is found throughout the Indian region referred to, both on the plains and even the hills; it extends to China.

###### 5. M. GUENTHERI<sup>7</sup>, Day.

Fresh waters along the Malabar coast of India.

The 5 species show the following distribution:—2 throughout

<sup>1</sup> Includes *E. koilomatodon*, Bleeker.

<sup>2</sup> Includes:—*E. humeralis*, Cuv. & Val.; *E. prismatica*, Bleeker.

<sup>3</sup> Includes *E. buccata*, Blyth.

<sup>4</sup> Includes:—*Rhynchobdella orientalis* and *arab*, Bl. Schn.; *R. ocellata*, Cuv. & Val.; *Mastacembelus pentophthalmus*, Gronov.

<sup>5</sup> Includes *Mastacembelus punctatus*, Cuv. & Val.

<sup>6</sup> Includes:—*M. ponticerianus* and *marmoratus*, Cuv. & Val.; *Macrognathus caudatus*, *undulatus*, and *Hamiltonia*, M'Clelland.

<sup>7</sup> Includes ?*Mastacembelus malabaricus*, Jerdon.

India to China; 1 India, excluding the west and south coasts, also Assam; 1 locally in the Malabar coast; 1 locally in Burma.

### Family MUGILIDÆ.

#### Genus MUGIL.

1. *M. CORSULA*, Ham. Buch.

Rivers and estuaries of Bengal and Burma.

2. *M. HAMILTONII*, Day.

Rivers of Burma.

3. *M. CASCASIA*, Ham. Buch.

Ganges and Jumna rivers; also in the Brahmaputra, in Assam.

Of the foregoing three species of Mulletts<sup>1</sup> from the fresh waters of India and Burma, none has been recognized either in Africa or the Malay archipelago.

Following out the sea and estuary species of this genus would lead to no conclusions. Mulletts extend their range through vast regions; and those found in India and Africa appear, with but few exceptions, to be also present in the Malay archipelago. It is curious, however, that the freshwater species in India have strongly ctenoid scales, such in the marine forms being usually cycloid or feebly ctenoid.

### Fam. OPHIOCEPHALIDÆ.

#### Genus OPHIOCEPHALUS.

1. *O. MARULIUS*<sup>2</sup>, Ham. Buch.

Fresh waters throughout India and Ceylon to China.

2. *O. LEUCOPUNCTATUS*<sup>3</sup>, Sykes.

Deccan, Coromandel and western coasts of India, China.

3. *O. PSEUDOMARULIUS*, Günther.

? Mysore, probably a hybrid.

4. *O. BARCA*<sup>4</sup>, Ham. Buch.

Large rivers of Bengal, N.W. Provinces, and Assam.

<sup>1</sup> Great errors occur in the distribution of Indian fishes, due to mistakes originating with European museum-naturalists, who, transposing labels, still adhere to their original statements. Thus *M. nepalensis*, Günther, is evidently a skin of *M. dussumieri*, Cuv. & Val., erroneously labelled Nepal instead of Calcutta.

<sup>2</sup> Includes ?*Ophiocephalus Theophrasti*, Val., and *O. aurolineatus*, Day (young).

<sup>3</sup> Includes Russell's pl. 173, *O. grandinosus*, C. & V.

<sup>4</sup> Includes ?*O. nigricans*, C. & V., and *O. amphibius*, McClelland.



5. *O. MICROPELTES*<sup>1</sup>, Cuv. & Val.

Canara and Malabar, also Siam to the Malay archipelago.

This fish is very peculiar in its colour; having obtained one at Cochin of a bright scarlet with two black bands along the body, in 1863, I naturally concluded it could not be the immature of *O. micropeltes*, described in the 'Catalogue of Fishes of the British Museum' as "brown with lighter longitudinal stripes." Returning to that coast ten years subsequently, I discovered the *O. micropeltes* at Trichoor, about 40 miles north of Cochin; and a few months subsequently I was enabled to collect in Canara adult and young. At Berlin, and subsequently at Dr. Bleeker's, I have convinced myself of their identity. But it is very peculiar that this fish has such a local distribution in India, reappearing in Siam.

6. *O. STRIATUS*<sup>2</sup>, Bloch.

Fresh waters of the plains in the Indian and Ceylon region, Burma, to the Malay archipelago and beyond.

7. *O. STEWARTII*, Playfair.

Cachar and Assam.

8. *O. GACHUA*<sup>3</sup>, Ham. Buch.

Fresh waters of the plains, and also some of the hilly ranges of Beluchistan, Afghanistan, the Indian and Ceylon region, Burma, and the fresh waters of the Andamans.

9. *O. PUNCTATUS*<sup>4</sup>, Bloch.

Fresh waters of the plains in the Indian and Ceylon region, Burma.

The 9 foregoing species show the following distribution:—2 throughout India to the Malay archipelago or China; 1 the Indian region, including Ceylon, Burma, and the Andamans; 1 the Indian region, including Ceylon and Burma; 1 Deccan, Western and Coromandel coast and China; 1 perhaps Mysore; 1 large rivers of Bengal, N.W. Provinces, and Assam; 1 Malabar coast, then absent until Siam, whence it extends to the Malay archipelago; 1 Cachar and Assam.

The distribution of the *Ophiocephali* deserves particular attention, one species, identical with *O. gachua* of India, being found in the Andamans. Reasons will be subsequently adduced favour-

<sup>1</sup> Includes *O. serpentinus*, C. & V., and *O. diplogramme*, Day (young).

<sup>2</sup> Includes *O. wrahl*, Lacép., and *O. chena*, Ham. Buch.

<sup>3</sup> Includes:—*O. kora molta*, Russell; *O. aurantiacus*, Ham. Buch.; *O. fuscus*, *marginatus*, and *limbatus*, Cuv. & Val.; *O. montanus*, M'Clelland; *O. Kelaartii*, Günther.

<sup>4</sup> Includes:—*O. karrouvei*, Lacép.; *O. latus*, Ham. Buch.; *O. indicus*, M'Clelland; *O. affinis*, Günther. Fresh waters of the plains of the Indian region and Ceylon.

ing the belief that the freshwater fishes of the Andamans and Nicobars are identical with those of India. But as freshwater fishes cannot live in the sea, they are unable to pass from the mainland to distant islands; consequently there must at some anterior period have been a land connexion to make the continuity of the fresh waters possible. Admit such to be a fact, there arises the question, Are the aborigines to be considered African whilst the freshwater fish are Indian? or are we to look to the remnants of the aboriginal races of the hills of Hindustan to find the relatives of these people? Does not the presence of these Indian fishes at the Andamans afford another link in the evidence that those coral islands are sinking? for were they rising from the ocean, how could we expect to find *Ophiocephalus gachua*, H. B., and *Haplochilus panchax*, H. B., in existence in their fresh waters? Introduced the latter one could not have been; for it to cross the intervening seas is an impossibility,—leaving us to believe either in a former land connexion or a new creation, and that not of new species but of fishes identical with those on the mainland of India. Again the *O. leucopunctatus* appears in the Deccan and around the coasts, reappearing in China. But the *O. micropeltes* is still more extraordinary: it appears to be confined to Canara and Malabar nearly as far south as Cochin; then it is entirely absent until Siam is reached, whence it extends eastwards.

#### GENUS CHANNA.

##### C. ORIENTALIS<sup>1</sup>, Bl. Schn.

This species has only been found in Ceylon. It is very similar to *Ophiocephalus gachua*, which is frequently found with one of its ventrals deficient.

#### FAM. LABYRINTHICI.

##### GENUS ANABAS.

##### A. SCANDENS<sup>2</sup> Dald.

Throughout Bengal, Assam, throughout Southern India, the Malabar coast, and Ceylon; also Burma to the Malay archipelago and beyond.

##### GENUS POLYACANTHUS.

##### 1. P. CUPANUS, Cuv. & Val.

Southern India on the Malabar and Coromandel coasts.

<sup>1</sup> Includes *Channa indica*, Gronov. ed. Gray.

<sup>2</sup> Includes:—*Anthias testudineus*, Bloch; *Cojus cobojus*, Ham. Buch.; *Anabas spinosus*, Gray & Hardw.; *A. trifoliatus*, Kaup; *A. oligolepis*, Günther.

2. *P. SIGNATUS*, Günther.

Ceylon and Java.

## Genus OSPHROMENUS.

*O. NOBILIS*, M<sup>c</sup>Clelland.

Rivers of N.E. Bengal and Assam, extending to those of the hills.

## Genus TRICHOGASTER.

1. *T. CHUNA*<sup>1</sup>, Ham. Buch.

Deltas of the Ganges and its branches, and the Brahmaputra.

2. *T. LABIOSUS*, Day.

Irawaddi.

3. *T. FASCIATUS*<sup>2</sup>, Bl. Schn.

Coromandel coast of India as far south as the river Kistna, Sind, Punjab, N.W. Provinces, estuaries of the Ganges, Orissa and Assam, also throughout Burma.

4. *T. LALIUS*<sup>3</sup>, Ham. Buch.

Sind, Jumna, and Ganges rivers as low as Calcutta.

## Fam. CHROMIDES.

## Genus ETROPLUS.

1. *E. CANARENSIS*<sup>4</sup>, Day.

Fresh waters of South Canara, not extending down Malabar.

2. *E. MACULATUS*<sup>5</sup>, Bloch.

From Canara down the Malabar coast, Madras, and Mysore.

3. *E. SURATENSIS*<sup>6</sup>, Bloch.

From Canara down the western coast, extending inland on to the Ghauts; along the Coromandel coast as high as the Kistna; also Ceylon.

It is now necessary to examine the foregoing species as a whole, showing where they are found, and to where they extend, as only by doing so can one ascertain the tendencies shown towards either the African or Malayan fish-fauna.

<sup>1</sup> Includes ?*Trichopodus sota*, Ham. Buch.

<sup>2</sup> Includes *T. colisa*, *bejeus*, and *cotra*, Ham. Buch., and *Colisa ponticeriana*, Cuv. & Val.

<sup>3</sup> Includes *Colisa unicolor*, Cuv. & Val.

<sup>4</sup> D 22 | 8, A  $\frac{15-16}{6}$ . L. l. 31, L. tr. 22. Yellowish buff, with about 8 vertical bluish-black bands. See 'Fishes of India,' p. 414, pl. 89. fig. 5.

<sup>5</sup> Includes *Chaetodon kakaitset*, Lacép., and *Etroplus coruchi*, Cuv. & Val.

<sup>6</sup> Includes *Etroplus meleagris*, C. & V.

Indian region* to Africa and the Malay archipelago.....	2
„ to the Malay archipelago.....	5
„ (excluding Malabar and Assam) to Burma	2
„ (excluding Malabar, Assam, and Burma)	1
„ (excluding Ceylon and Sind) to Burma ..	1
„ Ceylon and Burma .....	1
„ Ceylon, Burma, and Andamans .....	1
„ (excluding Southern India and Malabar coast).....	2
N. W. Provinces and regions to the south, Western India, Assam, and Burma .....	1
Bengal, Burma, and Malay archipelago .....	1
Burma, Siam, and Malay archipelago .....	2
Burma .....	4
Bengal and Burma .....	1
N. E. Bengal and Assam .....	1
Cachar and Assam .....	1
Sind, Jumna, and Ganges .....	1
Ganges, Jumna, and Assam .....	3
Deccan, coasts of India, China .....	1
Western coast of India, Siam, Malay archipelago .....	1
Western coast of India .....	5
Canara.....	2
Southern India and Malabar.....	3
Ceylon .....	1
Ceylon and Java.....	1
Mysore .....	1

It is remarkable that I am unable to find a single Acanthopterygian freshwater fish restricted to Africa and India: there are two found in both regions; but they also extend to the Malay archipelago.

Although out of the foregoing 45 species only 2 are residents of Africa, we find 9 of them in the Malay archipelago which are also in India proper, and 2 coexistent in Burma and the Malay archipelago. Another species is common to Ceylon and Java. Or they may be thus divided:—

Restricted to the Indian region .....	33
Indian region to the Malay archipelago .....	9
Burma to the Malay archipelago .....	2
Ceylon to the Malay archipelago .....	1

\* This is intended to mean India, Sind, and the Punjab only.

Of the marine and estuary species, I find:—common to India,  
 Africa, and the Malay Archipelago... 5  
 Africa only ..... 1  
 Malay archipelago ..... 30  
 India only ..... 35

Acanthopterygian forms of freshwater fishes in India are most numerous in maritime districts, next in the deltas of large rivers, whilst they decrease as we proceed far inland. The Himalayas appear to be their boundary; but on some of the lower ranges the ubiquitous *Ophiocephalus gachua* manages to exist. It is remarkable, however, that the family having the widest distribution is that of the amphibious *Ophiocephalidæ*, whilst it also is the one in which true spines are the least developed.

I propose deferring my general remarks until after the completion of my analysis of the remaining orders of the freshwater fishes, which must be done by following out the range of each individual species. By such means only can we fairly consider it proved whether the African or Malayan fish-fauna most predominates in India: it will show us distinctly the relationship of Ceylon to Southern India; and likewise by such the former continuity between India and the Andamans and Nicobars may be proved or disproved.



Description of a new Hornbill from the Island of Panay. By R. BOWDLER SHARPE, M.A., F.L.S., F.Z.S., &c., Senior Assistant, Zoological Department, British Museum.

[Read December 21, 1876.]

IN my paper on the birds of the Philippine Islands, which the Society is about to publish in the 'Transactions,' I have noticed an apparently new species of Hornbill from the Island of Panay; but as Mr. Elliot is at the present time engaged on a Monograph of this family of birds (*Bucerotidæ*), I have permitted him to figure this interesting species; and as it is possible that the part of his Monograph containing a description of the bird may appear before my own memoir in the 'Linnean Transactions,' I think it but due to Professor Steere, myself, and the Society, herewith to furnish a short description.

Professor Steere has given me the following notes respecting its habits:—"I shot this Hornbill on the highest ridge of the